

Distribution and Abundance of Zooplankton in Kan Taw Gyi Lake, Taungoo Township, Bago Region

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Abstract

Zooplankton are indicators of environmental quality in both lakes and rivers. It plays a key role in aquatic food chain and important food items of omnivorous and carnivorous fishes. The purpose of this study was to determine the composition, abundance and distribution of zooplankton in Kan Taw Gyi Lake, Taungoo Township. Zooplankton were collected from two study sites in Kan Taw Gyi Lake. Site I is located in northern and site II is located in southern Kan Taw Gyi Lake. A total of 22 species belonging to 17 genera of 12 families and seven orders of zooplankton were observed. The abundance of zooplankton species was highest in wet season as compare to cool season. Zooplankton were more abundant in site I than site II. Copepods were the most diverse group among the recorded zooplankton groups. This finding suggested that the distribution of zooplankton community was associated with the seasons and sites of the Lake.

Keywords: Zooplankton, species composition, distribution, abundance, Kan Taw Gyi Lake, Taungoo

Introduction

The word 'plankton' is originated from the Greek 'planktos' which means 'drifting'. Planktons are microscopic organisms that form the base of food chains and food webs in all aquatic ecosystems. It is an enormous group of aquatic organisms drifting about in water under the action of water movement (Zheng, 1984).

Zooplankton plays an important food item of omnivorous and carnivorous fishes. The larvae of carps feed mostly on zooplankton (Bardach, 1972) because zooplankton provides the necessary amount of protein requires for the rapid growth and development of different organs specially the ground of fishes. Brood fishes' productivity depend on zooplankton as an ideal food source of them (Roy, 2010).

Freshwater zooplankton is an important live food organisms that plays one of the primary consumers' trophic level in an aquatic ecosystem the source of food for the larvae of fish and prawns (Paterson, 2001).

Materials and Methods

Study area and Study sites

Zooplankton were collected from two different sites of Kan Taw Gyi Lake, Taungoo Township. It is situated between Latitude 18° 56' 0" and Longitude 96° 25' 0".

Necessary Equipment and apparatus utilized

Plankton net, slides, pipettes, formalin, Hand phone, plastic baskets, plastic containers, cotton wool and binocular compound microscope.

Specimen and data collection

Water samples (one litre each) were collected monthly from the three different sites in the creek. Zooplankton specimens were collected from the water samples by using a (26 cm diameter, 100 µm mesh-size) plankton net. The collected specimens were preserved in 2 % formalin. Water samples collected in one litre plastic containers were brought to the laboratory of the Zoology Department, Taungoo University for analysis.

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Preparation of microscope slides and identification of zooplankton

Collected specimens, preserved in 2 % formalin, were shaken for 10 seconds and one ml plankton samples were taken by using a pipette and placed on the slide. The specimens were observed, identified and counted under a binocular microscope at the magnification of 40 x and then measured under a microimage microscope. All specimens were examined within one week, after collection. Identification was made after Davis (1955) and Edmondson (1959).

Data analysis

Species composition, monthly abundance of zooplankton in different sites, comparison of population of zooplankton in different sites were tabulated.

Analysis of dominance index was done according to the method of Kumar and Sivaperuman (2005). Dominance index was calculated as the number of individuals of each species divided by total number of individuals of all species and multiplied by 100.

$$\text{Dominance index} = \frac{\text{No. of individual of each species}}{\text{Total number of individuals of all species}} \times 100$$

Abundance categories based on index values are:

Rare species	= (0.1 – 2.0)	Uncommon	= (2.1 – 4.0)
Frequent	= (4.1 – 6.0)	Common	= (6.1 – 8.0)

Results

Species composition

A total of 22 species were collected from two different sites in Kan Taw Gyi Lake. Among them, five species of Phylum Rotifera and 17 species of Phylum Arthropoda belonging to 17 genera of 12 families were recorded. Five genera were of Phylum Rotifera, five genera of Order Cladocera, one genus of Order Cypridopina, five genera of Order Cyclopoida and only one genus of Order Harpacticoida were identified. Among the recorded species, five species (22.73% of the total) were rotifers followed by six species (27.28%) of cladocerans, one species (4.55%) of ostracods and ten species (45.6%) of copepods (Figure 1 and Table 1).

General characters of the recorded species

(1) Scientific name - *Filinia termibnalis*

General character - Body has an elongate, cylindrical body composed of three basic section: head, trunk and foot. Sac- like body with the anterior end straight. There is no lorica. Setae are smooth or they have minute bristles.

(2) Scientific name - *Anuraeopsis fissa*

General character - Dorsal plate arched, ventral plate almost flat.

(3) Scientific name - *Asplanchna priodonta*

General character - Large, sac-shaped organisms with broad foot spectrum. Transparent. Foot, gut and anus are absent. Two little, red eyes. Trophi incudate.

(4) Scientific name - *Euchlanis dilatata*

General character - Anterodorsal margin with semicircular notch.

(5) Scientific name - *Collotheca mutabilis*

General character - Body slender, long, cylindrical. Anterior wider, with 2 coronal lobes. Gelatinous case large. Cilia on coronal lobes longer than interlobal region. Mastx uncinete.

- (6) Scientific name - *Sida crystallina*
 General character - Six pairs of foliaceous legs. Dorsal ramus of antenna three-segmented.
- (7) Scientific name - *Daphnia pulex*
 General character - Antennules of female are usually small, sometime rudimentary; if large never inserted at anterior end of ventral surface of head. Five pairs of legs. Dorsal ramus of antenna 4-jointed, ventral ramus 3-jointed, Intestine simple with 2 hepatic ceca. Spinulation extends over slightly more than ½ ventral margin of valve. Anterior margin of head with rounded crest. Head as deep as long.
- (8) Scientific name - *Bosmina longirostris*
 General character - Body small, spheroidal to ovate; small sense hair is usually near the centre of eye; base of antennule mucro short; eye large. Sensory bristle midway between eye and tip of rostrum.
- (9) Scientific name - *Alona monacantha*
 General character - Valves with distinct longitudinal striae; inferopostea; angle with 1 to 3 small teeth. Postabdomen with 9 to 10 denticles; claws with very long basal spine. Keel of labrum produced into posterior angle.
- (10) Scientific name - *Alona karua*
 General character - Valves with oblique striae; inferoposteal angle with 1 to 4 minute teeth. Postabdomen broad, expanded behind anus; apex rounded; with about 8 minute marginal denticles and as many larger lateral fascicles.
- (11) Scientific name - *Pleuroxus denticulatus*
 General character - Postabdomen moderately long; straight; color greenish or yellowish; usually transparent. Pastabdominal claw with two basal spines. Postanal dorsal margin of postabdomen flat, may have a slight depression distally.
- (12) Scientific name - *Prionocypris canadensis*
 General character - Terminal seta of furca short, about equal in length to dorsal seta. Valves are thin and semipellucid; surface smooth and sparsely hairy. Natatory setae are rudimentary. Furca is powerfully developed and straight. Dorsal seta is small and attached near apex.
- (13) Scientific name - *Eucyclops prionophorus*
 General character - Caudal ramus is 4 times as long as broad, with prominent saw on outer margin. Fifth leg of one distinct segment bears three terminal spines or setae, 12 antennule segments, and relatively long caudal rami. the caudal rami of *E. prionophorus* are between 4-5 times as long as they are broad.
- (14) Scientific name - *Eucyclops agilis*
 General character - Spines cover the majority of the outer margin of the caudal ramus. Caudal ramus less than five times as long as wide, 12 segments in the first antennae, fifth legs has one distinct segment. Length width ratio of terminal endopod segment on leg 4 typically.
- (15) Scientific name - *Cyclops vicinus*

General character - Body is moderately slender, 4- segmented antennae; uniramous body constricted between fourth and fifth leg. 4th thorax segment is strongly protruded, the seta attached to the 1st basal joint. 4th pair of legs is much thinner. Colour varies, grey hue, brownish red or reddish yellow colour.

(16) Scientific name - *Cyclops scutifer*

General character - Body elongated; single medium eyes; antennules large; antennae short; colour brightly or pale, transparent.

(17) Scientific name - *Cyclops bicuspidatus*

General character - Body cylindrical or pear- shaped; single medium eye; antennules large; colour brightly or pale, transparent.

(18) Scientific name - *Mesocyclops leuckarti*

General character - The antennae consist of 17 segments. The seta on the outer edge of the tail is attached near the middle. Inner margin of caudal ramus bare, inner spine of second segment of leg 5 shorter than terminal seta. The colour is generally pale yellow, with a more or less distinct bluish green tinge.

(19) Scientific name - *Mesocyclops edax*

General character - Haired inner surfaces of the caudal rami and free margin of the coupler of leg 4, which has two broadly rounded, triangular protrusions. Inner margin of caudal ramus with hairs, inner spine of second segment of leg 5 longer than terminal seta; hyaline plate of last segment of first antennae with a number of sharp notches.

(20) Scientific name - *Cyclopoid nauplius*

General character - Three pairs of abbreviated appendages representing the first antennae, second antennae and mandibles.

(21) Scientific name - *Nauplius* sp.

General character - Pairs of cephalic appendages are present such as the first antenna, mandible, maxilla, the second antenna and maxillae. Unsegmented body, three pairs of appendages and a single, simple, “naupliar” eye.

(22) Scientific name - *Metis jouseaumei*

General character - Rostrum with 2 apical spines. Legs 2 to 4: exopod segment 3 with 5,6,6 spines and setae, endopod segment 3 with 4,4,4 setae. The orange spots on the elytra are transverse, through very irregular.

Monthly variation of individual numbers of zooplankton in two study sites

A total of 22 species were recorded in site I, II respectively. Maximum species number occurred in site I and minimum in site II. Higher number of individuals were observed in site I while the lower number of individuals were observed in site I.

In site I and site II *Asplanchna priodonta* was the highest number among the rotifers, while the copepods *Cyclops vicinus* and *Cyclops scutifer* were higher number among the crustaceans throughout the study period. At site I and site II none of the rotifers were found in the wet season.

Comparison of seasonal abundance of zooplankton in two study sites

In site I, maximum number of 1380 individuals were recorded in June and minimum number 231 in December. *Cyclops vicinus* was found in June to December with highest number. *Cyclops vicinus* was found in all months with highest individual number. *Bosmina longirostris* was found in March and *Cyclops bicuspidatus* was found in December with lowest number (Figure 2).

In site II, maximum number of 1337 individuals were found in August and minimum 209 in December. *Cyclops scutifer* was found in February to August with highest number. *Sida crystallina* was found in February with lowest individual number (Figure 3).

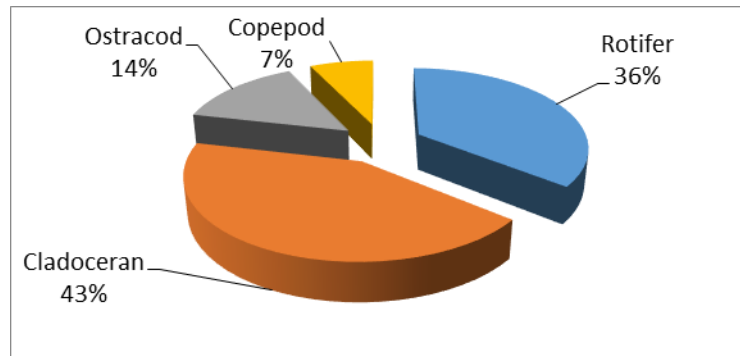


Figure 1. Species occurrence (% of total) among the recorded zooplankton groups

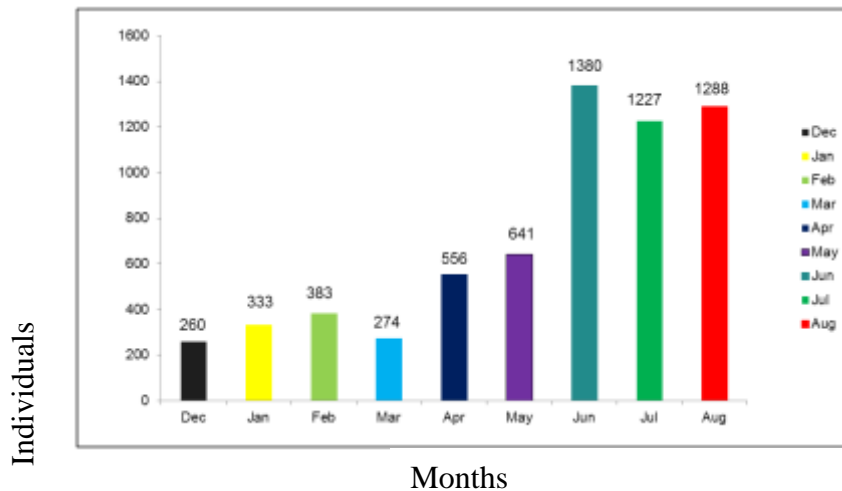


Figure 2. Monthly fluctuation of total number of individuals of zooplankton in site I

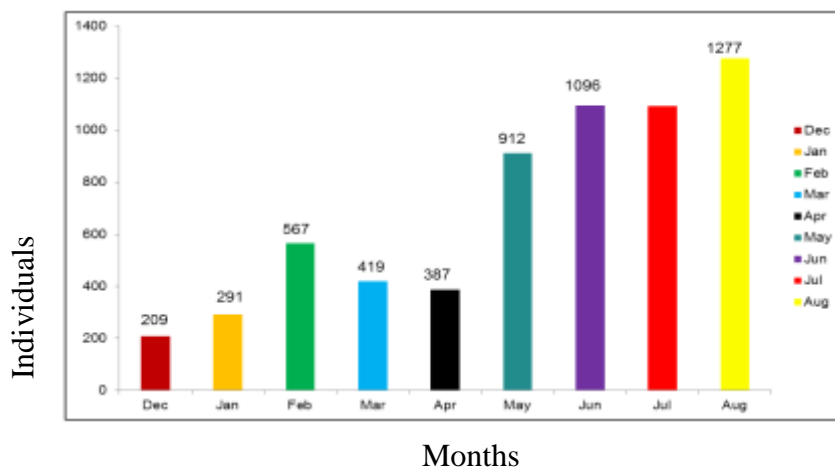
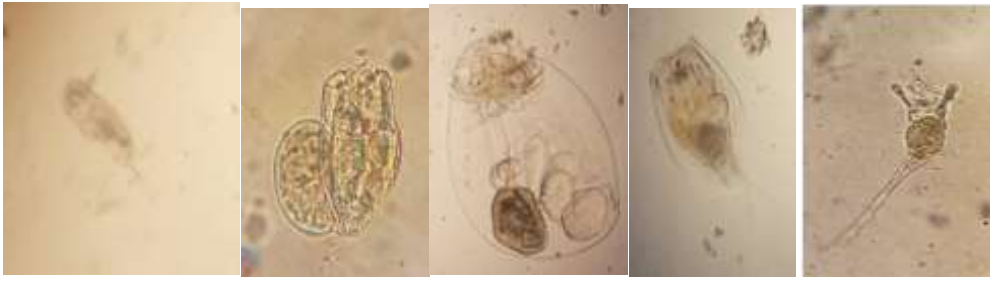


Figure 3. Monthly fluctuation of total number of individuals of zooplankton in site II



A. *Filinia terminalis* B. *Anuraeopsis fissa* C. *Asplanchna priodonta* D. *Euchlalis dilatata* E. *Collotheca*



F. *Sida crystallina* G. *Daphnia pulex* H. *Bosmina longirostris* I. *Alona*



K. *Pleuroxus denticulatus* L. *Prionocypris canadensis* M. *Eucyclops prionophorus* N. *Eucyclops*



P. *Cyclops scutifer* Q. *Cyclops bicuspidatus* R. *Mesocyclops leuckarti* S. *Mesocyclops*



U. *Nauplius* sp.

V. *Metis jousseaumei*

Plate 1 Recorded zooplankton species from the study area

Table 1. Recorded zooplankton species from two different study sites

Phylum	Class	Order	Family	Species
Rotifera	Monogononta	Bdelloida	Trochosphaeridae	1. <i>Filinia terminalis</i> (Plate,1886)
Ploima	Brachionidae			2. <i>Anuraeopsis fissa</i> (Gosse,1851)
	Asplanchnidae			3. <i>Asplanchna priodonta</i> (Gosse,1850)
Euchlanidae				4. <i>Euchlalis dilatata</i> (Ehrenberg,1832)
	Collothecaceae	Collothecidae		5. <i>Collotheca mutabilis</i> (Hudson,1885)
Arthropoda	Branchiopoda	Cladocera	Sididae	6. <i>Sida crystallina</i> (O.F.Muller, 1776)
			Daphnidae	7. <i>Daphnia pulex</i> (Leydig,1860)
				8. <i>Bosmina longirostris</i> (O.F. Muller,1776)
				9. <i>Alona monacantha</i> (Sars, 1901)
				10. <i>A. karua</i> (King, 1853)
				11. <i>Pleuroxus denticulatus</i> (Birge, 1879)
	Ostracoda	Cypridopina	Cyprididae	12. <i>Prionocypris canadensis</i> (Sars,1926)
Copepoda	Cyclopoida	Cyclopidae		13. <i>Eucyclops prionophorus</i> (Kiefer,1931)
				14. <i>E. agilis</i> (Koch, 1838)
				15. <i>Cyclops vicinus</i> (Sars, 1863)
				16. <i>C. scutifer</i> (Sars,G.O. 1863)
				17. <i>C. bicuspidatus</i> (Claus, 1857)
				18. <i>Mesocyclops leuckarti</i> (Claus, 1857)
				19. <i>M. edax</i> (Forbes, 1891)
				20. <i>Cyclopoid nauplius</i> (
				21. <i>Nauplius</i> sp. (O.F. 1785)
		Harpacticoida	Metidae	22. <i>Metis jousseaumei</i> (Richard, 1892)

Discussion

In the present study, the zooplankton distribution of Kan Taw Gyi Lake at two different sites. The study found 22 zooplankton species belonging to 17 genera and ten families. Rotifera (14 species), Order Cladocera (five species), Order Cyclopoida (two species) and only one species of Order Copepoda.

Population of zooplankton was the highest in site I. Since it obtained more sunlight for the growth of phytoplankton and consequently this provided organic nutrient for zooplankton is at site II.

Each species of *Cyclops vicinus* in Site I and *Cyclops scutifer* in Site II were abundant and the species of Site I *Cyclops vicinus* was observed throughout the study period.

The present results revealed that wet season was the favourable period for maximum growth and total population was dominated by copepods, and increase of phytoplankton and favourable weather conditions. the population of zooplankton species was lower in cool season and higher in wet season.

Conclusion

During the study period, the population of zooplankton in site I were found to be the highest number and site II in zooplankton were found to be the lowest in number because site I obtained more sunlight for the growth of phytoplankton and provided organic nutrients for zooplankton species. The abundance of zooplankton could potentially contribute the survival and growth of fish larvae in the Kan Taw Gyi Lake.

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